

A new method for V0 reconstruction in NA49 CERN experiment

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The NA49 CERN experiment uses four large Time Projection Chambers (TPC) for tracking. Two (VT1/2) are placed inside magnets, and two (MTPCs) are placed further downstream and on both sides of the beam. A set of central Pb+Pb events was taken with the target placed about 30 cm upstream of the entrance of the MTPCs. In this configuration (without magnetic field) the reconstruction of V0 -type vertices is done the conventional way (by combining track pairs), but by using straight instead of curved tracks [1]. The momentum of the parent and daughter particles can be inferred from the decay angles if one assumes their masses. This is done by solving the energy/momentum conservation equations. The advantages of this method include

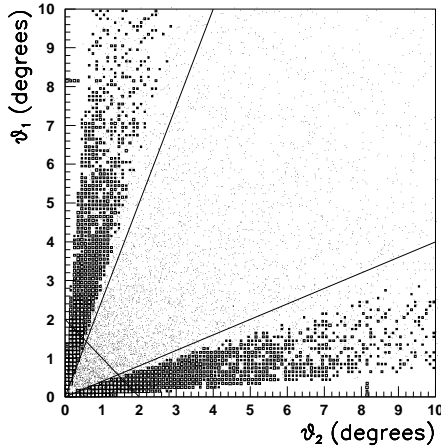


Figure 1: Daughter particle decay angle distribution (relative to the parent direction) for K_S^0 (dots) and Λ (squares).

the easier/high-accuracy (straight line) tracking in the large MTPC volumes, the absence of ExB distortions, and the target proximity to the active volume. Also, this method provides complementary information to the standard V0 analysis

done in the two vertex TPCs [2].

The separation of K_S^0 from Λ is done by placing cuts in the angles between the parent and daughter particles. In Λ decays the opening angle of the proton cannot exceed a certain value whereas the K_S^0 decay is symmetric (see Fig.1). The background was found to be combinatoric and, depending on the set of cuts, in the range 20-30%. It was estimated using simulated events (see Fig.2) and subtracted from the reconstructed signal. The reconstruction efficiency was estimated by either, using simulated events, or by embedding in raw events simulated decays.

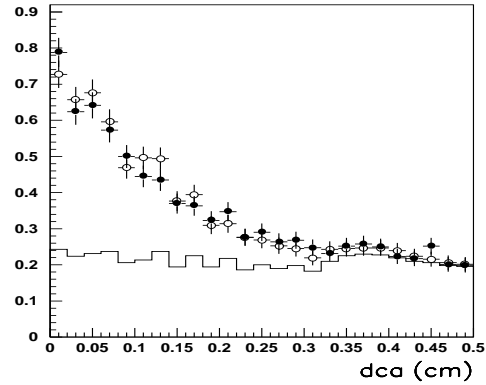


Figure 2: Normalized distribution of the distance of two daughter particles at the decay vertex (dca). Filled symbols are data, open symbols are simulated data and the solid line is the background only in the simulated data.

References

- [1] K. Alpgard et al., Phys.Lett. 115B(82)65
G.J. Alner et al., Nucl.Phys B 258(85)505
- [2] S. Margetis, Heavy Ion Phys. 4 (96) 63